

JPL
SPECIMEN
COST-PLUS-A-FIXED-FEE
RESEARCH & DEVELOPMENT CONTRACT

Contract No. TBA

BETWEEN

**CALIFORNIA INSTITUTE OF TECHNOLOGY
JET PROPULSION LABORATORY
(The "Institute" or "JPL")
4800 OAK GROVE DRIVE
PASADENA, CALIFORNIA 91109-8099**

AND

**THIS CONTRACT FOR
MID-INFRARED INSTRUMENT (MIRI) Si:As Detectors for the James Webb Space Telescope (JWST)**

**IS A
SUBCONTRACT UNDER JPL's NASA PRIME CONTRACT**

TASK ORDER NO. 10637

A DO - C9 Rating is assigned to this Contract under DMS Regulation 1

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SIGNATURE PAGE 9

The following documents are incorporated into and made a material part of this contract.

GENERAL PROVISIONS: Cost-Reimbursement with Commercial Organizations Contract R 8/01, with Incorporated Exhibits.

- Management of Government Property in the Possession of Contractors, Form JPL 0968
- Release of Information, Form JPL 1737
- Affiliate Access Report, Form JPL 1943
- Notification to Prospective Contractors of JPL's Ethics Policies and Anti-Kickback Hotline, Form JPL 2385
- Certifications, Form JPL 2892
- Asbestos Notification, Form JPL 2895

ADDITIONAL GENERAL PROVISIONS (AGPs)

Cost Accounting Standards and Administration of Cost Accounting Standards R 4/99

or

Disclosure and Consistency of Cost Accounting Practices, and Administration of Cost Accounting Standards R 4/99

New Technology R 8/01

Prime Contract Expiration – Cost/CREI

Safety and Health R 4/00

PREAMBLE

This Contract, entered into on _____ by and between the CALIFORNIA INSTITUTE OF TECHNOLOGY (hereinafter called the “Institute” or “JPL”), a corporation organized and existing under the laws of the State of California, and _____ (hereinafter called the “Contractor”), a corporation organized and existing under the laws of the State of _____ and constituting a subcontract under Prime Contract NAS7-1407 between the Institute and the Government;

WITNESSETH THAT:

The Contractor agrees to furnish and deliver the supplies and perform the services set forth in this Contract for the consideration stated herein.

SCHEDULE

On or Before

ARTICLE 1. STATEMENT OF WORK AND DELIVERY INSTRUCTIONS

- 1.0 The Contractor shall provide the necessary labor, materials, special tools, facilities, services, test equipment and management to design, fabricate, hybridize, test and deliver engineering and flight Si:As impurity band conduction detectors hybridized to cryo-readouts and mounted on motherboards as specified below.

In the performance of this effort the Contractor shall perform the following tasks:

1.1 Design, Fabrication, Hybridization, Assembly and Test.

1.1.1 Develop a Si:As impurity band detector array:

1.1.1.1 Design, layout and procure a nominal 1024x1024 array mask set according to the architectural design requirements listed in Section 2 of Exhibit I, entitled the James Webb Space Telescope (JWST) Mid-Infrared Instrument (MIRI) Detector Requirements Document.

1.1.1.2 Develop AR coating(s) for the imager to cover the entire IR wavelength range (5 to 28 μm) and for the spectrometer covering two ranges (5 to 12 μm and 12 to 28 μm).

1.1.1.3 Fabricate at least two (2) lots of Si:As impurity band detectors. (The Contractor shall decide if the AR coating(s) will be applied to the Si:As wafers or to the individual hybrid arrays).

1.1.1.4 Test and characterize each lot. This characterization shall include as a minimum: QE, spectral response, and operability, measured at 7K on at least two (2) die from three (3) different wafers. Dark current properties at 7 K shall be estimated from measurements taken at higher temperatures.

1.1.2 Develop a low noise cryogenic readout

1.1.2.1 Design, layout and procure a nominal 1024x1024 array mask set according to the architectural design requirements listed in Section 2 of Exhibit I, entitled "JWST/MIRI Detector Requirements Document."

1.1.2.2 Fabricate at least two (2) lots of cryo-readouts

1.1.2.3 Probe test all readout die from all the process wafers.

- 1.1.2.4 Characterize the readout lots. This characterization shall include as a minimum: operability, noise and dynamic range, all measured at 7K on at least two (2) parts from at least three (3) different wafers.

1.1.3 Hybridization, packaging and test

- 1.1.3.1 Design and procure motherboards with the interface, form factor, and materials coordinated with JPL's instrument design group.
- 1.1.3.2 Hybridize at least 40 Si:As detectors to the readouts from any lot or combination of lots and mount them on either chip carriers or onto the motherboards for cryo-testing at your facilities, JPL, NASA Ames, and other groups as requested by JPL. Apply AR coating if the Si:As wafers are uncoated.
- 1.1.3.3 Test all the "good" operational hybrids at 7K. These tests should include as a minimum: total SCA noise, responsivity (QE), well capacity, pixel operability, and uniformity. These tests should be performed under the observational conditions listed in Section 5 of Exhibit I.
- 1.1.3.4 Demount from chip carrier and mount on motherboards from JPL selected hybrids, if they were delivered and tested on chip carriers. Warm test to confirm that no damage or degradation has occurred.

1.1.4 Data

Establish, maintain and provide a database to archive all relevant test data. All test data shall be made available to JPL fifteen (15) days after taking the data. This archive shall be maintained for a minimum of ten (10) years after delivery of the last hybrid. The data shall include:

- | | | |
|---------|--|-------------------------------|
| 1.1.4.1 | Detector data on all the different Si:As detector types fabricated and tested as specified in section 1.1.1.4 | 15 days after taking the data |
| 1.1.4.2 | Readout data from all the readout fabricated and tested as specified in paragraphs 1.1.2.3 and 1.1.2.4. | 15 days after taking the data |
| 1.1.4.3 | Room temperature and cryogenic test data on all the hybrids fabricated and tested as specified in paragraph 1.1.3.3. | 15 days after taking the data |

1.1.5 Program support

Provide technical support for the detailed hybrid tests to be

performed at JPL and NASA Ames and other groups. These tests include but are not limited to cryogenic performance tests, QA, environmental and radiation tests.

- 1.2 Deliverables (Need date of first part is indicated in the right column):
- 1.2.1 Two (2) sample hybrid arrays similar in character to the ones that will be delivered in this program to be used for JPL test station development. One Month ADOC
 - 1.2.2 Four (4) sample readouts (bare multiplexers) from each lot fabricated in this program, mounted on appropriate chip carriers. Deliver one (1) month after completing the probe testing of each readout lot. 8 Months ADOC
 - 1.2.3 Twenty (20) hybrids from the first detector and readout lots, the engineering lots, mounted on chip carriers or motherboards. Deliver in a period of three (3) months with the first deliveries one month after the start of the hybridization and packaging. 11 Months ADOC
 - 1.2.4 Ten (10) hybrids, selected by JPL, AR coated, mounted and bonded to motherboards using the flight pads, if the hybrids were delivered and tested on chip carriers. 19 Months ADOC
 - 1.2.5 Twenty (20) hybrids from the final detector and readout lots, or any lots, mounted on chip carriers or onto motherboards. Deliver in a period of three (3) months with the first deliveries one month after the start of the hybridization and packaging. 26 Months ADOC
 - 1.2.6 Twelve (12) hybrids, selected by JPL, AR coated, mounted and bonded to motherboards using the flight pads, if the hybrids were delivered and tested on chip carriers. 30 Months ADOC
- 1.3 Program Plans and Data Review:
- 1.3.1 Prepare and submit all data as defined in Exhibit II (Contract Data Requirements List and Data Requirements Description) to JPL
 - 1.3.2 Implement provisions of the plans required in Exhibit II subsequent to JPL approval
- 1.4 Program Reviews:
- 1.4.1 Preliminary Design Review (PDR) package and PDR at the contractor's facility. 2 months ADOC
 - 1.4.2 Critical Design Review (CDR) package and CDR at the contractor's facility at least one (1) month before the schedule fabrication of the first lot. 1 month before the start of processes
 - 1.4.3 Second CDR at the contractor's facility if either the detector or the readout need to be re-designed or re-layout at least one (1) month 1 month before the start of the processes

before the scheduled fabrication of the second lot.

1.4.4 Data review at the contractor's facility

As Required

1.5 Management and technical liaison and Program meetings:

1.5.1 The Contractor shall assign a cognizant technical person as the focal point for technical responsibilities

1.5.2 Maintain informal technical liaison between JPL's Contract Technical Manager, and his alternate to permit JPL's timely involvement in relevant technical meetings, technical reviews, and problem solving sessions at the Contractor's facility.

1.5.3 Conduct informal quarterly program meetings at the contractor's facility to evaluate the program's technical, schedule and budget progress.

1.5.4 Participate in a monthly telecon that addresses accomplishments, status of activities, problem status, cost and schedule variances identified in your Monthly Status Report in MA 003. The Contractor Program Manager should be the focal point for this telecon.

1.5.5 Provide Status Reports by e-mail monthly reports in Adobe PDF format. The monthly report shall include a brief technical status report and the monthly schedule progress and costs.

1.6 Advanced Notification

Provide advanced notification to JPL personal as follows:

1.6.1 To the Cognizant Quality Assurance Representative or the JPL Contract Technical Manager (CTM), two (2) working days in advance of Contractor Material Review Board (MRB) activities that involve repair or use-as-is disposition to permit JPL review and participation in the approval or disapproval of MRB decisions.

1.6.2 To the cognizant Quality Assurance Representative or JPL CTM two (2) working days in advance of a Mandatory Inspection Point (MIP) as identified in the Manufacturing and test flow charts in Exhibit II/QA-001.

2.0 Exhibits

The following Exhibits are hereby incorporated into and made a part of this Contract:

2.1 Exhibit I – Mid-Infrared Instrument (MIRI) Detector Requirements Document, D-24161 for the James Web Space Telescope, dated 04/2/03

2.2 Exhibit II – Contract Data Requirements List, dated 02/28/03

3.0 JPL will:

- 3.1 Review and approve or disapprove documents submitted by the Contractor within ten (10) working days after receipt at JPL by the Contract Negotiator, If no response has been received, the Contractor shall proceed as if approval has been given.
- 3.2 Provide interface documents to design and fabricate the motherboard.
- 3.3 Provide tested and selected SCAs to be demounted, AR coated and mounted on motherboards if the hybrids do not already have AR coatings and/or were delivered and tested on chip carriers.
- 3.4 Provide the JPL documents mentioned in Exhibits I through II.
- 3.5 Resolve technical issues with the Contractor on a timely basis and provide in-scope technical direction in writing via Technical Direction Memoranda (TDM's) as necessary by the JPL Contract Negotiator
- 3.6 Provide a Quality Assurance Representative to witness formal, final acceptance tests (as JPL deems necessary), to inspect parts (as JPL deems necessary), and to participate in all MRB actions that require "repair" or "use-as-is" disposition.

4.0 Delivery Instructions

- 4.1 Except as otherwise provided in this Contract, the point of inspection, final acceptance and delivery of all supplies deliverable under this Contract shall be the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, California 91109. All such supplies shall be packaged, packed, or boxed, crated in such a manner to ensure safe delivery and shall be shipped prepaid and at the Contractor's expense to the point of delivery.
- 4.2 The Contractor shall furnish the Contracting Officer (CO) with the annual and final reports of reportable items described in the Article entitled "New Technology." Copies of transmittal letters for those reports shall be sent to the Intellectual Property Office (IPO) and to the cognizant JPL Negotiator.

Or

- 4.3 The Contractor shall provide the Contracting Officer (CO) the annual and final reports of subject inventions described in the Article entitled "Patents Rights – Retention by the Contractor (Short Form)." Copies of transmittal letters shall be sent to the Intellectual Property Office (IPO) and to the cognizant JPL Negotiator.

ARTICLE 2. ALLOWABLE COSTS, FIXED FEE AND PAYMENT.

1.0 Estimated Cost and Fixed Fee.

Estimated Cost:	\$
Fixed Fee:	\$
Total:	\$

Subject to any equitable adjustment which is otherwise provided for under the provisions of this Contract, the fixed fee stated above shall remain constant for the performance of the work under this Contract. There shall be no adjustment in the amount of fixed fee or any claim for increased fixed fee because of errors or omissions made in computing the estimated cost or the fact that the actual cost varies from the estimated cost.

The total amount allotted to this Contract is \$

- 2.0 Precontract Costs. There shall be no allowance for costs incurred prior to the date of this Contract. If this Definitive Contract has been preceded by a Letter Contract, the phrase "date of this Contract" as used in this paragraph 2.0 shall mean the effective date of the Letter Contract.
- 3.0 Payment of Fixed Fee. The fixed fee payable under this Contract shall be paid to the Contractor in monthly installments based upon the percentage of work completed as estimated by the Contractor and approved by JPL; subject, however, to the provisions of the "Allowable Cost and Payment" Article of this Contract.
- 4.0 Invoices. Invoices shall be submitted, in triplicate, to JPL Subcontract Payment Group, 4800 Oak Grove Drive, Pasadena, California 91109.
- 5.0 Allowable Costs. For the purpose of determining the amounts payable to the Contractor under this Contract, the allowability of costs shall be determined in accordance with the General Provision (GP) of this Contract entitled "Allowable Cost and Payment;" provided, however, that in determining the allowability of costs, the advance understandings, if any, on particular items of cost set forth below shall be given effect. In the event of any inconsistency between such advance understandings and the cost principles referred to in the "Allowable Cost and Payment" GP referenced above, the cost principles shall prevail.
- 5.1 Direct Costs:

ARTICLE 3. SPECIAL PROVISIONS

1.0 Key Personnel and Facilities

The personnel and/or facilities, if any, specified below in paragraph (*) are considered essential to the work being performed hereunder. Prior to removing, replacing, or diverting any of the specified individuals or facilities, the Contractor shall notify JPL reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this Contract. No diversion shall be made by the Contractor without the written consent of JPL; provided, that JPL may ratify in writing the change, and such ratification shall constitute the consent of JPL required by this Article. Paragraph (b) below may, with the consent of the Contracting parties, be amended from time to time during the course of the Contract to either add or delete personnel and/or facilities, as appropriate.

The following Contractor personnel shall be considered Key Personnel under this Contract:

2.0 Taxes – Withholding

JPL may withhold from any payments, which are due and payable under the Contract, such amounts that JPL determines must be withheld in compliance with State and/or Federal Tax Withholding requirements. JPL shall not be liable for amounts incorrectly withheld under this Provision; provided, however, that if JPL determines that any amounts due to the Contractor have been incorrectly withheld, and said amounts have not already been remitted to the taxing authority, JPL will pay such amounts to the Contractor within a reasonable period of time.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

CALIFORNIA INSTITUTE OF TECHNOLOGY

By _____
{TYPE NAME OF ACQUISITION REP HERE}

(Title)

{TYPE NAME OF CONTRACTOR HERE}

By _____
(Signature)

(Typed Name)

(Title)

Instructions to Contractor: Do not insert date on Preamble page.